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10/18/00 U.S. PTO

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EL628375954US

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<b>UTILITY PATENT APPLICATION TRANSMITTAL</b> <small>(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))</small>	Attorney Docket No.	550718-077
	First Inventor or Application Identifier	Kamei
	Title	ABRASIVE MATERIAL
	Express Mail Label No.	EL 628375954 US

APPLICATION ELEMENTS <small>See MPEP chapter 600 concerning utility patent application contents.</small>	ADDRESS TO: Assistant Commissioner for Patents Box Patent Application Washington, DC 20231
1. <input checked="" type="checkbox"/> * Fee Transmittal Form (e.g., PTO/SB/17) (Submit an original and a duplicate for fee processing)	5. <input type="checkbox"/> Microfiche Computer Program (Appendix)
2. <input checked="" type="checkbox"/> Specification [Total Pages 9] (preferred arrangement set forth below) <ul style="list-style-type: none"><li>- Descriptive title of the invention</li><li>- Cross References to Related Applications</li><li>- Statement Regarding Fed sponsored R &amp; D</li><li>- Reference to Microfiche Appendix</li><li>- Background of the invention</li><li>- Brief Summary of the invention</li><li>- Brief Description of the Drawings (if filed)</li><li>- Detailed Description</li><li>- Claim(s)</li><li>- Abstract of the Disclosure</li></ul>	6. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary) <ul style="list-style-type: none"><li>a. <input type="checkbox"/> Computer Readable Copy</li><li>b. <input type="checkbox"/> Paper Copy (identical to computer copy)</li><li>c. <input type="checkbox"/> Statement verifying identity of above copies</li></ul>
3. <input checked="" type="checkbox"/> Drawing(s) (35 U.S.C. 113) [Total Sheets 1]	<b>ACCOMPANYING APPLICATION PARTS</b> 7. <input type="checkbox"/> Assignment Papers (cover sheet & document(s)) 8. <input type="checkbox"/> 37 C.F.R. § 3.73(b) Statement of Power of Attorney (when there is an assignee) <input type="checkbox"/> Attorney 9. <input type="checkbox"/> English Translation Document (if applicable) 10. <input type="checkbox"/> Information Disclosure Statement (IDS)/PTO-1449 <input type="checkbox"/> Copies of IDS Citations 11. <input checked="" type="checkbox"/> Preliminary Amendment 12. <input type="checkbox"/> Return Receipt Postcard (MPEP 503) (Should be specifically itemized) 13. <input checked="" type="checkbox"/> * Small Entity Statement(s) <input type="checkbox"/> Statement filed in prior application, Status still proper and desired (PTO/SB/09-12) 14. <input type="checkbox"/> Certified Copy of Priority Document(s) (if foreign priority is claimed) 15. <input checked="" type="checkbox"/> Other: Return Postcard
4. Oath or Declaration [Total Pages 3] <ul style="list-style-type: none"><li>a. <input checked="" type="checkbox"/> Newly executed (original or copy)</li><li>b. <input type="checkbox"/> Copy from a prior application (37 C.F.R. § 1.63(d)) (for continuation/divisional with Box 16 completed)<ul style="list-style-type: none"><li>i. <input type="checkbox"/> DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).</li></ul></li></ul>	
<b>* NOTE FOR ITEMS 1 &amp; 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).</b>	

16. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: \_\_\_\_\_

Prior application information: Examiner \_\_\_\_\_ Group / Art Unit: \_\_\_\_\_

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

## 17. CORRESPONDENCE ADDRESS

☐ Customer Number or Bar Code Label (Insert Customer No. or Attach bar code label here) or ☒ Correspondence address below

Name	THEODORE D. LIENESCH				
	THOMPSON HINE & FLORY LLP				
Address	2000 COURTHOUSE PLAZA N.E., 10 W. SECOND STREET				
City	DAYTON	State	OHIO	Zip Code	45402
Country	MONTGOMERY	Telephone	9374436958	Fax	9374436635

Name (Print/Type)	JOHN F. KANE	Registration No. (Attorney/Agent)	44,815
Signature	<i>John F. Kane</i>	Date	10/18/00

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

# FEE TRANSMITTAL for FY 2000

Patent fees are subject to annual revision.  
Small Entity payments must be supported by a small entity statement,  
otherwise large entity fees must be paid. See Forms PTO/SB/09-12.  
See 37 C.F.R. §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT (\$ 355.00

## Complete If Known

Application Number

Filing Date

First Named Inventor

Examiner Name

Group / Art Unit

Attorney Docket No.

KAMEI

550718-077

## METHOD OF PAYMENT (check one)

1. ☒ The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:

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Account  
Number

20-0809

Deposit  
Account  
Name

Thompson Hine & Flory

- ☒ Charge Any Additional Fee Required  
Under 37 CFR §§ 1.16 and 1.17

2. ☒ Payment Enclosed:

- ☒ Check ☐ Money Order ☐ Other

## FEE CALCULATION

### 1. BASIC FILING FEE

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
101	690	201	345	Utility filing fee	355
106	310	206	155	Design filing fee	
107	480	207	240	Plant filing fee	
108	690	208	345	Reissue filing fee	
114	150	214	75	Provisional filing fee	

SUBTOTAL (1) (\$ 355

### 2. EXTRA CLAIM FEES

Total Claims		Extra Claims		Fee from below		Fee Paid
12	-20**		X			355
	-3**		X			

\*\*or number previously paid, if greater; For Reissues, see below

Large Entity		Small Entity		Fee Description
Fee Code	Fee (\$)	Fee Code	Fee (\$)	
103	18	203	9	Claims in excess of 20
102	78	202	39	Independent claims in excess of 3
104	260	204	130	Multiple dependent claim, if not paid
109	78	209	39	** Reissue independent claims over original patent
110	18	210	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) (\$

## FEE CALCULATION (continued)

### 3. ADDITIONAL FEES

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	380	216	190	Extension for reply within second month	
117	870	217	435	Extension for reply within third month	
118	1,360	218	680	Extension for reply within fourth month	
128	1,850	228	925	Extension for reply within fifth month	
119	300	219	150	Notice of Appeal	
120	300	220	150	Filing a brief in support of an appeal	
121	260	221	130	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,210	241	605	Petition to revive - unintentional	
142	1,210	242	605	Utility issue fee (or reissue)	
143	430	243	215	Design issue fee	
144	580	244	290	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	690	246	345	Filing a submission after final rejection (37 CFR § 1.129(a))	
149	690	249	345	For each additional invention to be examined (37 CFR § 1.129(b))	

Other fee (specify) \_\_\_\_\_

Other fee (specify) \_\_\_\_\_

\*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$

## SUBMITTED BY

Name (Print/Type)	JOHN F. KANE	Registration No. (Attorney/Agent)	44,815	Telephone	9374436816
Signature	<i>John F. Kane</i>	Date	10-18/00		

## WARNING:

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Applicant or Patentee : KAMEI TEKKOSHO Ltd.  
Serial or Patent No. :  
Filed or Issued :  
For : ABRASIVE MATERIAL

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS  
(37 CFR 1.9(f) and 1.27(c)) - SMALL BUSINESS CONCERN**

I declare that I am

- ☐ the owner of the small business concern identified below:
- ☐ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN: KAMEI TEKKOSHO Ltd.  
ADDRESS OF CONCERN: 9-4, Takaidanaka 4-chome, Higashi Osaka, Japan

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with respect to the invention, entitled ABRASIVE MATERIAL by inventor(s) Haruo Kamei, described in

- ☒ the specification filed herewith
- ☐ Application Serial No. \_\_\_\_\_, filed \_\_\_\_\_
- ☐ Patent No. \_\_\_\_\_, issued \_\_\_\_\_

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below\* and no rights to the invention are held by any person, other than the inventor, who could not qualify as a

small business concern under 37 CFR 1.9(d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).  
\*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

[ ]INDIVIDUAL [X]SMALL BUSINESS CONCERN [ ]NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING:

Haruo Kamei

TITLE OF PERSON OTHER THAN OWNER:

ADDRESS OF PERSON SIGNING:

c/o KAMEI TEKKOSHO Ltd.

9-4, Takaidanaka 4-chome,

Higashi Osaka, Japan

SIGNATURE

X Haruo Kamei

X

DATE: September 29, 2000

**CERTIFICATE OF MAILING**

I hereby certify that this correspondence is being deposited in the United States Postal Service as express mail in the envelope addressed to: Assistant Commissioner of Patents, Washington, D.C. 20231, on

October 18, 2000

(Date of Deposit)

*John F. Kane*  
(Attorney)

44,815

(Reg No.)

**PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of

Applicant : Haruo Kamei

Serial No. :

Filed : Herewith

Title : ABRASIVE MATERIAL

Docket : 550718-077

Examiner :

Art Unit :

Assistant Commissioner of Patents

Washington, D.C. 20231

**PRELIMINARY AMENDMENT**

For examination and prior to calculating the filing fee, please amend the above-identified application as follows:

**IN THE CLAIMS:**

Please delete claims 1-6 without prejudice.

Please add the following new claims:- -

7. An abrasive material comprising a core and a polishing layer, wherein said polishing layer comprises a flexible layer formed on the surface of the core and abrasive particles.
8. An abrasive material according to claim 7 wherein said core is made of a porous synthetic foamed resin.
9. An abrasive material according to claim 7 wherein said flexible layer contains abrasive particles.
10. An abrasive material according to claim 8 wherein said flexible layer contains abrasive particles.
11. An abrasive material according to claim 7 wherein said polishing layer comprises multiple layers.
12. An abrasive material according to claim 8 wherein said polishing layer comprises multiple layers.
13. An abrasive material according to claim 9 wherein said polishing layer comprises multiple layers
14. An abrasive material according to claim 7 wherein said flexible layer comprises an emulsion adhesive, the abrasive particles are attached onto the emulsion adhesive and the emulsion adhesive is subjected to a heating and drying process.
15. An abrasive material according to claim 8 wherein said flexible layer comprises an emulsion adhesive, the abrasive particles are attached onto the emulsion adhesive and the emulsion adhesive is subjected to a heating and drying process.

16. An abrasive material according to claim 9 wherein said flexible layer comprises an emulsion adhesive, the abrasive particles are attached onto the emulsion adhesive and the emulsion adhesive is subjected to a heating and drying process.

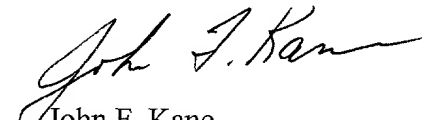
17. An abrasive material according to claim 7 wherein said polishing layer comprising an emulsion adhesive mixed with abrasive particles is applied to the core and then subjected to a heat and drying process.

18. An abrasive material according to claim 11 wherein said polishing layer comprising an emulsion adhesive mixed with abrasive particles is applied to the core and then subjected to a heat and drying process.

**REMARKS**

The claims have been amended to eliminate multiple dependent claims and present the claims in better form to comply with U.S. practice. Any questions regarding this application may be directed to the applicant's undersigned attorney at the telephone number indicated below.

Respectfully submitted,

  
John F. Kane  
Reg. No. 44,815

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Dayton, Ohio 45401-8801  
(937) 443-6816  
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## ABRASIVE MATERIAL

## BACKGROUND OF THE INVENTION

## FEILD OF THE INVENTION

5           The present invention relates to an abrasive material for use in the surface finishing process of a variety of works including a metal, a ceramic, a plastic or a composite material of some of these, and in particular, to an abrasive material for use in the surface finishing process of a work having a complicated irregular contour.

## 10   DESCRIPTION OF THE RELATED ART

          Conventional arts are disclosed in US Patent Application Ser. No. 08/826,344 and Japanese Patent No. 2957492. In both prior arts, an abrasive material is constructed with attaching abrasive particles to the surface of a core. The material of the core or the abrasive particles is appropriately  
15   modified to be applied for the surface finishing of a variety of works, and performs the surface finishing on a surface of the work even if it has an irregular contour.

          The conventional abrasive material has the following drawback. To finish the surface of a work, the abrasive particles need to be selected in view  
20   of the material of the work. The core itself also needs to be selected from among appropriate materials. In the surface finishing method using the abrasive material, a number of abrasive materials are sprayed to the surface of a work at a slant angle as to the surface, thereby sliding on the work surface and polishing the affected area of the surface. To assure a distance of travel  
25   of the abrasive material, the core needs to be flexible. If the hardness of the core is requested more, flexibility is further required of the core.



A good binder, for causing the abrasive particles to adhere to the surface of the core, in terms of adherence density and workability, is not always available, and the binder currently has still room for improvements.

## 5 SUMMARY OF THE INVENTION

The present invention has been developed in view of the above problems, and it is an object of the present invention to provide an abrasive material which is easy to produce, needs no rigorous criteria in the selection of a core, and imparts, to a binder of abrasive particles, flexibility,  
10 conventionally required of the core, at no expense of surface finishing performance.

To achieve the above object, the present invention employs a layer, having a flexibility, on the surface of a core. Abrasive particles are then attached to the flexible layer, forming an abrasive layer. The abrasive  
15 material with the abrasive particles thereof grinds, polishes, buffs, and performs a mirror finishing on, the surface of a work. The abrasive material is sprayed onto the work surface at a slant angle with respect to the work surface. The flexible layer absorbs impact when the abrasive material strikes the work surface, thereby allowing the abrasive material to slide on the work  
20 surface.

In view of the property of the abrasive material of the present invention for polishing, a hard material, such as a metal or a ceramic is preferably avoided as the material of the core. However, the core material is not limited to any particular one. It is important that the core has a polishing  
25 effect. The core is preferably formed of porous synthetic foamed resin. This is because impact absorbing and repellant properties prevent the work

surface from being excessively ground in a finishing step.

It is not a requirement that the flexible layer and the polishing layer are two distinctly delineated layers. For instance, the flexible layer may be mixed with the abrasive particles with no clear interface present between two  
5 layers.

The material of the core is preferably suitable for recycling. The abrasive particles are inevitably come off from the core when it impacts the work at a slant angle with respect to the core surface. Although the abrasive material of this invention is based on the assumption that abrasive particles are re-attached to the core when it is recycled, the use of multiple polishing  
10 layers allows the abrasive material to be used at least several times consecutively. The number of steps required to re-attach abrasive particles is reduced. "Multiple polishing layers" can define at least two polishing layers, and the flexible layer may have a multi-layer structure. For instance, a layer  
15 structure of the surface of a core, a flexible layer, a polishing layer, a flexible layer and a polishing layer falls within the scope of the multi-layer structure of the present invention.

Besides the impact absorbing property, the above-discussed flexible layer preferably has a function of allowing the abrasive particles to adhere  
20 thereto. In accordance with the present invention, the flexible layer is produced by subjecting an emulsion adhesive to a heating and drying process. The emulsion adhesive is appropriate in that it has proper flexibility and structural strength subsequent to setting. When abrasive particles are applied through a barrel polishing method, a good efficiency in an attaching step is  
25 assured because the internal surface of a drum is free from sticking by abrasive particles because of a low viscosity of the adhesive.

The flexible layer is produced in one of two methods. In a first method, an emulsion adhesive as a flexible layer is applied onto a core, and abrasive particles are then attached to the flexible layer. The flexible layer is then subjected to a heating and drying process. In a second method, an emulsion adhesive as a flexible layer, beforehand mixed with abrasive particles, is applied to a core, and the flexible layer is then subjected to a heating and drying process.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagram illustrating the concept of an abrasive material of the present invention; and

FIG. 2 illustrates a method of recycling the abrasive material.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, the embodiment of the present invention is discussed. FIG. 1 illustrates the concept of an abrasive material 10 of the present invention. A flexible layer 2 is formed on the surface of a core 1, and a polishing layer 3 is formed on a top of the flexible layer 2.

The core 1 serves as a core of the abrasive material 10. In this embodiment, a porous material having elasticity, such as a synthetic foamed resin material, is cut into a core with its size ranging 50  $\mu$  to 5 mm. The material of the core is not limited to any particular one and any ordinary material may be used for the core. Specifically, the core is not limited to the synthetic foamed resin. The material of the core may be a synthetic material such as rubber, or a natural substance such as corn. Since a smaller core is subject to a smaller impact energy when it impacts a work, the polishing layer

3 is hard to come off from the core 1. But any particular limitation is set on the size of the core. A soft core having a low specific gravity is appropriate for mirror finishing, while a hard core having a large specific gravity is appropriate for grinding. Depending on applications, the core needs to be modified. The flexible layer 2 must be fabricated of a material having flexibility. Flexibility, which is conventionally required of the core, is now provided by the flexible layer2. When the abrasive material is directed to the surface of a work at a slant angle with respect to the work surface, the flexible layer 2 absorbs the impact caused, and assures sliding of the abrasive material.

10 The work is thus polished on the area thereof where the abrasive material slides.

The polishing layer 3 is fabricated of abrasive particles, and has the function of actually polishing the work surface. An appropriate material is selected for the abrasive particles, taking into consideration the work surface,

15 in a similar manner as in the conventional art.

The polishing layer 3 is formed by applying an adhesive onto the flexible layer 2 and attaching abrasive particles to the adhesive. Alternatively, the flexible layer 2 itself may be fabricated of an adhesive. Specifically, an emulsion adhesive is applied to the surface of the core 1, the abrasive particles are attached to the emulsion adhesive, and the emulsion adhesive is subjected to a heating and drying process. The adhesive becomes the flexible layer 2 having flexibility. The use of the adhesive as the flexible layer advantageously provides the adherence of the abrasive particles and the impact absorbing effect through flexibility. Because of its low viscosity, the

20 adhesive is easy to work with, and further is nontoxic.

Mixing the adhesive with the abrasive particles concurrently produces

the flexible layer 2 and the polishing layer 3. The method of forming the flexible layer 2 and the polishing layer 3 as separate layers and the method of forming the flexible layer 2 and the polishing layer 3 in a mixed layer fall within the scope of the present invention.

5 The emulsion adhesives may be of polyvinyl acetate resin, EVA resin, acrylic resin, synthetic rubber latex, and other resin. According to the tests conducted by the inventors of this invention, a synthetic rubber latex adhesive outperforms the other adhesives in adherence, flexibility, and ease of handling. The synthetic rubber latex adhesive is here an emulsion latex adhesive. The  
10 adhesive used in this invention is not limited to the emulsion latex adhesive, and alternatively, the use of emulsion of any of polyvinyl acetate resin, EVA resin, acrylic resin, and synthetic rubber latex falls within the scope of the present invention.

Each of the flexible layer 2 and the polishing layer 3 is not limited to a  
15 single layer. Alternatively, multiple layers may be employed. If each of the flexible layer 2 and the polishing layer 3 is a single layer, the abrasive particles need to be attached to at least the polishing layer 3, from which abrasive particles are come off, each time the abrasive material is used. The use of a multiple layer structure permits the abrasive material to be  
20 consecutively used several times. The abrasive material is thus continuously used for a continuous polishing operation. A multiple layer structure is produced through not only a method in which the formation of a flexible layer, the application of an adhesive, and the attachment of abrasive particles are repeated but also a method in which the mixing of an emulsion adhesive with  
25 abrasive particles, the attachment of the emulsion adhesive to the surface of a core, and the heating and drying process of the mixture.

FIG. 2 illustrates a barrel polishing method of recycling the polishing layer 3 by attaching abrasive particles to a used abrasive material, in which a drum 4 is used. A used abrasive material 10 is introduced into the drum 4 having an opening 5 on one side. The adhesive is then applied into the drum 4. The drum 4 is left rotating for an appropriate period of time to allow the adhesive to distribute among the abrasive materials 10. When the adhesive is evenly distributed among the abrasive materials 10, the abrasive particles are introduced into the drum 4 to allow the abrasive particles to adhere to the abrasive material 10. The production of the abrasive material 10 is completed by drying the adhesive in a dryer. However, if an adhesive is introduced prior to the introduction of the abrasive particles and is subjected to a drying process for fixation, the bonding strength of the abrasive particles is increased.

In accordance with the present invention, the flexible layer is arranged between the core and the polishing layer, the flexibility in the selection of the core is increased, and the abrasive material is thus easily manufactured. Since the dried emulsion adhesive is employed as the flexible layer, the impact absorbing property and the adherence of the abrasive particles are obtained with a simple construction.

## WHAT IS CLAIMED IS:

1. An abrasive material comprising a core, a flexible  
5 layer formed on the surface of the core, and abrasive particles  
wherein the flexible layer is mixed with the abrasive particles to  
form a polishing layer.

2. An abrasive material according to Claim 1, wherein  
the said core is made of a porous synthetic foamed resin.

10 3. An abrasive material according to one of Claims 1 and  
2, wherein the said flexible layer contains abrasive particles.

4. An abrasive material according to one of Claims 1, 2,  
and 3, wherein the said polishing layer comprises of multiple  
layers.

15 5. An abrasive material according to one of Claims 1, 2,  
and 4, wherein an emulsion adhesive as the said flexible layer is  
applied onto the core, the abrasive particles are attached onto the  
said emulsion adhesive, and then the said emulsion adhesive is  
then subjected to a heating and drying process.

20 6. An abrasive material according to one of Claims 1 and  
4, wherein an emulsion adhesive as the said flexible layer mixed  
with the abrasive particles is applied to the core, and is then  
subjected to a heating and drying process.

## ABSTRACT

A flexible layer is formed on a surface of a core, and a  
5 polishing layer mixed with abrasive particles is formed on a top  
of the flexible layer. The flexible layer is produced by  
applying an emulsion adhesive as a flexible layer onto a core and  
attaching abrasive particles onto the flexible layer, or by  
applying an emulsion adhesive mixed with abrasive particles  
10 onto a core. The flexible layer is then subjected to a heating  
and drying process. Thus obtained is an abrasive material  
which is easy to produce, needs no rigorous criteria in the  
selection of a core, and imparts, to a binder of abrasive particles,  
flexibility, conventionally required of the core, at no expense of  
15 surface finishing performance.



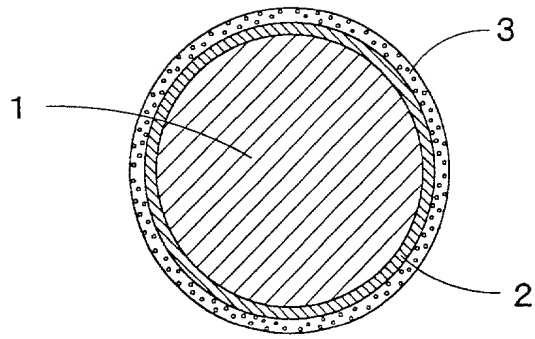


Fig. 1

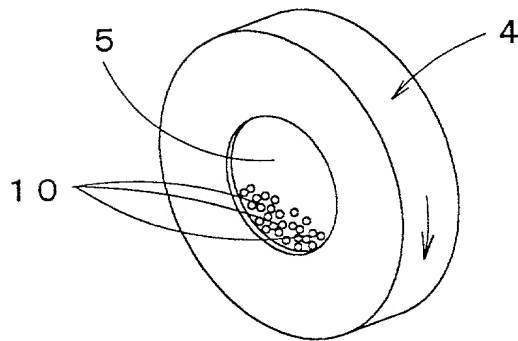


Fig. 2

**DECLARATION AND POWER OF ATTORNEY**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name; that

I verily believe I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the invention entitled:

**ABRASIVE MATERIAL,**

described and claimed

  X   in the attached specification;  
       in the specification filed \_\_\_\_\_,  
as U.S. Application Serial No. \_\_\_\_\_,  
and as amended \_\_\_\_\_.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as filed and as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

**PRIORITY CLAIM**

I hereby claim foreign priority benefits under title 35, United States Code, §119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application(s) for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

Prior Foreign Applications(s)

Priority Claimed

<u>2000-216408</u>	<u>Japan</u>	<u>17/07/00</u>	<u>  X  </u>	<u>      </u>
(number)	(Country)	Day/Mo/Yr	Yes	No
<u>          </u>	<u>          </u>	<u>          </u>	<u>      </u>	<u>      </u>
(number)	(Country)	Day/Mo/Yr	Yes	No

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below.

\_\_\_\_\_  
Application No.

\_\_\_\_\_  
Filing Date

\_\_\_\_\_  
Application No.

\_\_\_\_\_  
Filing Date

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

\_\_\_\_\_  
Application Serial No.

\_\_\_\_\_  
Filing Date

\_\_\_\_\_  
Status

\_\_\_\_\_  
Application Serial No.

\_\_\_\_\_  
Filing Date

\_\_\_\_\_  
Status

I appoint

Theodore D. Lienesch	Reg. No. 28,235
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my attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith. Address all telephone calls to (937) 443-6958. Address all correspondence to: Thompson Hine & Flory LLP, 2000 Courthouse Plaza N.E., P.O. Box 8801, Dayton, Ohio 45401-8801, Attention: Theodore D. Lienesch.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code, and that such willful false statements may

[illegible]